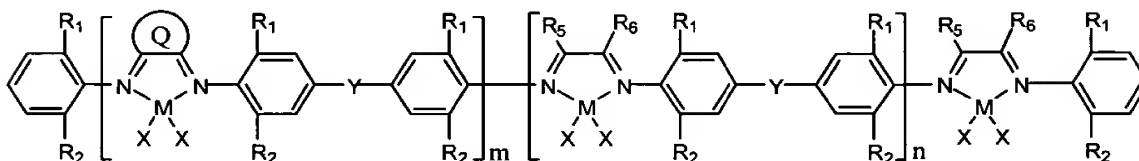
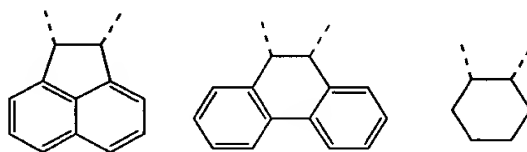


We claim:

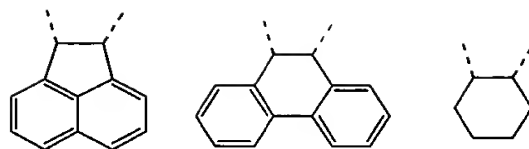
1. A polynuclear  $\alpha$ -diimine Ni(II) complex used as the precursor of the catalyst in polymerizing polyolefine, represented by the following formula:



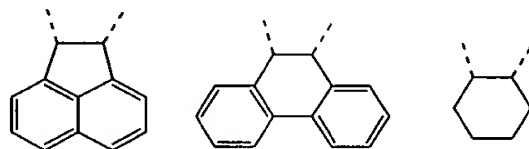
wherein M is Ni; X is Cl or Br; m and n is independently an integer from 0 to 100, respectively; R<sub>1</sub> and R<sub>2</sub> is the same or different, and is selected from the group consisting of H, methyl, ethyl, isopropyl and tert-butyl; Y is CR<sub>3</sub>R<sub>4</sub>, wherein R<sub>3</sub> and R<sub>4</sub> is the same or different, and is selected from the group consisting of H, methyl, ethyl, propyl, butyl and phenyl, or R<sub>3</sub> and R<sub>4</sub> forming a cyclic alkyl group; R<sub>5</sub> and R<sub>6</sub> is the same or different, and is selected from the group consisting of methyl, ethyl, propyl and heterocyclic group; Q is a cyclic divalent residual group of the following formula or a mixture thereof:



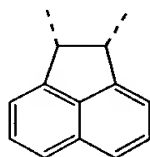
2. A polynuclear  $\alpha$ -diimine Ni(II) complex of claim 1, wherein, M is Ni; X is Cl or Br; m is an integer from 0 to 100, n is 0; R<sub>1</sub> and R<sub>2</sub> is the same or different, and is selected from the group consisting of H, methyl, ethyl, isopropyl and tert-butyl; Y is CR<sub>3</sub>R<sub>4</sub>, wherein R<sub>3</sub> and R<sub>4</sub> is the same or different and is selected from the group consisting of H, methyl, ethyl, propyl, butyl and phenyl, or R<sub>3</sub> and R<sub>4</sub> forming a cyclic alkyl group; Q is a cyclic divalent residual group of the following formula or a mixture thereof:



3. A polynuclear  $\alpha$ -diimine Ni(II) complex of claim 1, wherein, X is Br; m is an integer from 1 to 20, n is 0;  $R_1$  is isopropyl,  $R_2$  is methyl or isopropyl; Y is  $CR_3R_4$ , wherein  $R_3$  and  $R_4$  is the same and is H or methyl, or  $R_3$  and  $R_4$  forming a cyclohexyl group; Q is a cyclic divalent residual group of the following formula or a mixture thereof:



4. A polynuclear  $\alpha$ -diimine Ni(II) complex of claim 1, wherein, X is Br; m is an integer from 1 to 10, n is 0;  $R_1$  is isopropyl,  $R_2$  is methyl or isopropyl; Y is  $CR_3R_4$ , wherein  $R_3$  and  $R_4$  is the same and is H or methyl, or  $R_3$  and  $R_4$  forming a cyclohexyl group; Q is a cyclic divalent residual group of the following formula:



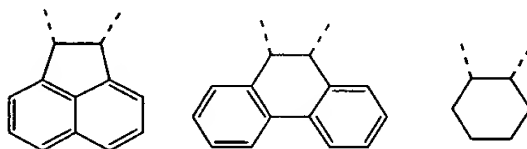
5. A polynuclear  $\alpha$ -diimine Ni(II) complex of claim 1, wherein, M is Ni; X is Cl or Br; m is 0, n is an integer from 1 to 100;  $R_1$  and  $R_2$  is the same or different and is selected from the group consisting of H, methyl, ethyl, isopropyl and tert-butyl; Y is  $CR_3R_4$ , wherein  $R_3$  and  $R_4$  is the same or different and is selected from the group consisting of H, methyl, ethyl, propyl, butyl and phenyl, or  $R_3$  and  $R_4$  forming a cyclic alkyl group;  $R_5$  and  $R_6$  is the same or different and is selected from the group consisting of methyl, ethyl, isopropyl and

heterocyclic group.

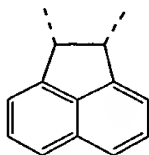
6. A polynuclear  $\alpha$ -diimine Ni(II) complex of claim 1, wherein, X is Br; m is 0, n is an integer from 1 to 30; R<sub>1</sub> is isopropyl, R<sub>2</sub> is methyl or isopropyl; Y is CR<sub>3</sub>R<sub>4</sub>, where R<sub>3</sub> and R<sub>4</sub> is the same, and is H or methyl, or, R<sub>3</sub> and R<sub>4</sub> forming a cyclohexyl group; R<sub>5</sub> and R<sub>6</sub> is methyl.

7. A polynuclear  $\alpha$ -diimine Ni(II) complex of claim 1, wherein, X is Br; m is 0, n is an integer from 1 to 20; R<sub>1</sub> and R<sub>2</sub> is isopropyl; Y is CR<sub>3</sub>R<sub>4</sub>, where R<sub>3</sub> and R<sub>4</sub> is the same, and is H or methyl; R<sub>5</sub> and R<sub>6</sub> is methyl.

8. A polynuclear  $\alpha$ -diimine Ni(II) complex of claim 1, wherein, X is Br; m is an integer from 1 to 10, n is an integer from 1 to 20; R<sub>1</sub> is isopropyl, R<sub>2</sub> is methyl or isopropyl; Y is CR<sub>3</sub>R<sub>4</sub>, where R<sub>3</sub> and R<sub>4</sub> is the same, and is H or methyl, or R<sub>3</sub> and R<sub>4</sub> forming a cyclohexyl group; R<sub>5</sub> and R<sub>6</sub> is methyl; Q is a cyclic divalent residual group of the following formula:

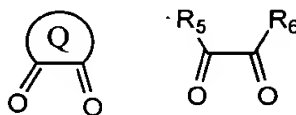


9. A polynuclear  $\alpha$ -diimine Ni(II) complex of claim 1, wherein, X is Br; m is an integer from 1 to 10, n is an integer from 1 to 20; R<sub>1</sub> and R<sub>2</sub> is methyl; Y is CR<sub>3</sub>R<sub>4</sub>, where R<sub>3</sub> and R<sub>4</sub> is the same, and is H or methyl; R<sub>5</sub> and R<sub>6</sub> is methyl; Q is a cyclic divalent residual group of the following formula:



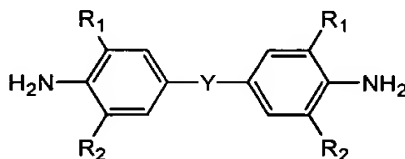
10. A method for the preparation of the polynuclear  $\alpha$ -diimine Ni(II) complex of claim 1, comprising the steps of:

(a) condensing an  $\alpha$ -diketone represented by the formula or a mixture thereof,



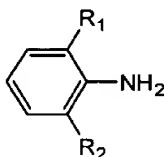
wherein, Q, R<sub>5</sub> and R<sub>6</sub> have the same definition in claim 1,

a substituted aromatic diamine represented by the formula



wherein, R<sub>1</sub>, R<sub>2</sub> and Y are as defined in claim 1,

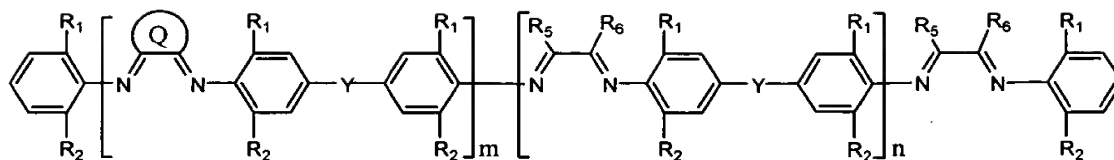
and a substituted aromatic amine represented by the formula



wherein, R<sub>1</sub> and R<sub>2</sub> are as defined in claim 1,

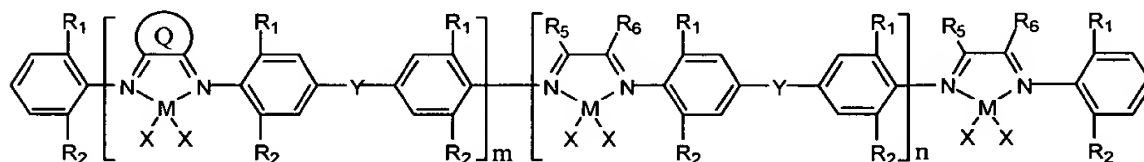
in a medium of alcohol, aromatic hydrocarbon, alcohol-ether mixture, or alcohol-halogenated hydrocarbon mixture and under the catalytic action of HCOOH, CF<sub>3</sub>COOH or HX, wherein X is F, Cl, Br, or I;

thereby obtaining an oligomer of substituted  $\alpha$ -diimine of the formula



wherein,  $R_1$ ,  $R_2$ ,  $R_5$ ,  $R_6$ ,  $Q$ ,  $Y$ ,  $m$  and  $n$  have the same definition in claim 1;

(b) carrying out coordination reaction of the oligomer of step (a) with  $NiX_2$ , wherein  $X$  is  $Cl$  or  $Br$ , in the absence of water and oxygen, thereby obtaining a polynuclear  $\alpha$ -diimino  $Ni(II)$  complex of the following formula:



wherein,  $R_1$ ,  $R_2$ ,  $R_5$ ,  $R_6$ ,  $Q$ ,  $Y$ ,  $M$ ,  $X$ ,  $m$  and  $n$  have the same definition in claim 1.

11. A method for preparing polyethylene, comprising the step of using the polynuclear  $\alpha$ -diimine  $Ni(II)$  complex of claim 1 as the precursor of the catalyst.